

## **Biology 427 Biomechanics Spring 2011 Project Proposal**

### **I: Overview**

The purpose of these projects is to give you an opportunity to explore in detail a topic that interests you most. This fun-filled exploration involves your posing a question about a biological process or phenomenon, examining in the literature what is known about the details related to your question, and posing a *quantitative* answer to the question you raise. You should consider this assignment to be similar to a more detailed homework problem that you would create for future biomechanics students. The topic should be related to material we are covering in the first half of the course and, thus, should revolve around the mechanical (material/structural) principles underlying biology. Since much of the material is new to you, I show below a list of ideas that people have asked in the past.

Here is an important point: we ask that you pose a question and address it *quantitatively* (much like a problem set, with Mathematica help where you need it). In addition, you must give the rationale for raising the question and some background about the relevant biology and physics that underlies the problem you pose. As such, it is extremely important to select a topic or problem that is sufficiently small so that you can address it in sufficient detail in a poster. You must provide both the biological background and the quantitative arguments in your poster.

In short, we ask that you read the literature, gather together disparate pieces of information to answer a question that you pose. Do not simply write a "book report" telling us what others have done or thought. Rather be critical in your reading of the literature. Use ideas or information that others have put forward along with course material to examine your issue. Indicate the relevant mechanics and what remains to be understood about a particular problem or what is wrong with past views. Be brave in formulating *quantitative* relations from material you have learned in the class.

For any topic, your first problem will be to find the appropriate information. Begin by perusing the references in your lecture notes or the course text. If these yield fruitful results, look them up in the Natural Sciences Library (NSL) or follow through with downloading the appropriate pdf files from the primary literature (and reading the ones you download)! Also, while Google is not particularly useful, it's subdivision, Google Scholar is quite helpful. As are the resources such as Medline and other journal data bases.

## **II: Instructions**

Only one submission per project is needed. Please write in sentences and paragraphs. Bullet responses are not optimal here.

Names: List names of all students involved.

(1)

(2)

Project Title:

Why did you select this project topic (what makes it interesting and worth pursuing) ?

What background information do you need and how do you plan to gather that information?

What analyses are you going to use and how might you implement them in Mathematica?

Describe any biomechanical principles that you hope to use in addressing this research topic.

Write a *provisional* abstract. At this stage, we are looking for a sample abstract, understanding that you have not yet done the work.

(see below and <http://www.ece.cmu.edu/~koopman/essays/abstract.html>)

An abstract is a short informative or descriptive summary of a longer report. It is usually written after the report is completed, although it is intended to be read first. Here, however, we ask that you write an abstract that you hope to achieve at the end of your research project.

An abstract summarizes the entire report and gives the reader an overview of the facts that will be laid out in detail in the paper itself. It is rarely longer than one page and should never exceed more than 10% of the length of the entire report; otherwise it defeats its own purpose. That said in the space provided you should be able to discuss the following four points.

1) Motivation/problem statement: Why do we care about the problem? What practical, scientific or theoretical gap is your research filling?

2) Methods/procedure/approach: What did you actually do to get your results?

3) Results/findings/product: As a result of completing the above procedure, what did you learn?

4) Conclusion/implications: What are the larger implications of your findings, especially for the problem/gap identified in step 1?